

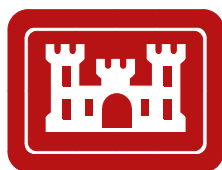
FINAL SITE INSPECTION REPORT

TEST AREA 7 (T-7)

LOUISIANA ARMY NATIONAL GUARD
CAMP MINDEN, LOUISIANA

JUNE 2014

Prepared for:



United States Army Corps of Engineers, Fort Worth District
Fort Worth, Texas

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ACRONYMS AND ABBREVIATIONS

4-AM-DNT	4-Amino-2,6-dinitrotoluene
°F	degrees Fahrenheit
amsl	above mean sea level
analog geophysics	analog magnetometer-assisted site reconnaissance
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHE	Chemical Hazard Evaluation
CWM	Chemical Warfare Material
DERP	Defense Environmental Restoration Program
DID	Data Item Description
DMM	discarded military munitions
DoD	Department of Defense
EHE	Explosive Hazard Evaluation
EOD	Explosive Ordnance Disposal
ft	feet
FUDS	formerly used defense sites
GPS	global positioning system
HHE	Health Hazard Evaluation
IC	institutional controls
LAAP	Louisiana Army Ammunition Plant
LAARNG	Louisiana Army National Guard
MC	munitions constituents
MEC	munitions and explosives of concern
mm	millimeter
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NFA	no further action
OU	Operable Unit
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
SEE	Stell Environmental Enterprises, Inc.
SI	Site Inspection
sq	square
T-7	Test Area 7
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
WWII	World War II

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EXECUTIVE SUMMARY

Congress established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program (DERP) to address unexploded ordnance (UXO), discarded military munitions (DMM), and munitions constituents (MC) located on current and formerly used defense sites (FUDS). MMRP eligible sites include areas other than operational ranges where UXO, DMM, or MC are known or suspected and the release occurred prior to 30 September 2002. The objective of this effort was to assess hazards posed by munitions and explosives of concern (MEC) at Test Area 7 (T-7) in compliance with these requirements.

Site Inspection and Scope

The primary objective of the MMRP Site Inspection (SI) was to determine whether this FUDS site warrants further response action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The SI collects the minimum amount of information necessary to make this determination, as well as: (1) determines the potential need for a removal action; (2) collects or develops additional data, as appropriate, for Hazard Ranking System scoring by the United States (U.S.) Environmental Protection Agency (EPA); and (3) collects data, as appropriate, to characterize environmental impact to the site, if present, for effective and rapid initiation of a Remedial Investigation and Feasibility Study (RI/FS).

The objective of the SI was to determine if MEC exist at the T-7 Munitions Response Site (MRS) related to former Department of Defense (DoD) operations. An additional objective of the SI is to collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol (MRSP). The SI was conducted in accordance with CERCLA and the National Oil and Hazardous Substances Contingency Plan. The technical approach for this SI was based on the Camp Minden SI Work Plan (SEE, 2013) and the Data Item Description (DID) Military Munitions Response Program (MMRP) -09-0001.

Site Inspection Summary

The T-7 Area was investigated from January 15th through January 16th, 2014 with three UXO technicians and two field support staff.

The T-7 Area is relatively level encompassing approximately 6.92 acres with two large areas of tree cover in the east and west central areas of the site. A line of trees was present along the fence line on the west, east, and northern site boundaries. A gravel road paralleled the western boundary from the southern end of the site for approximately 650 feet (ft) before turning eastward and crossing the site. The ground surface was very wet and swampy north of the gravel road. A large hole was observed in the fence along the northern boundary where animal tracks were visible. An intact bunker was present in the southwestern corner of the site.

The field team completed the geophysical survey of a total of 3.5 miles of transects within the T-7 Area. Ninety-four anomalies were detected during execution of the magnetic survey. Of these, 84 were identified as individual anomalies with individual registers of magnetic material and ten areas were identified as clusters containing multiple subsurface registers of magnetic material. Eleven debris piles were mapped during performance of this SI. The debris piles are assumed to be areas of concern due to presence of the large amounts of metallic material. An attempt to visually inspect each anomaly, anomaly cluster, or debris pile for the presence of MEC was performed when anomalies were identified. No digging was performed. The visual survey

portion of this effort did not indicate noticeable munitions debris at the surface. Where anomalies were likely associated with buried utilities, piping or other infrastructure, they were noted but eliminated from the anomaly findings as MEC.

It should be noted that the desired future use for this site is to support various training activities including intrusive activities such as EOD training.

MRSPP Scoring

MRSPP scoring sheets for the munitions response sites (MRSs) identified in this SI Report are included in Appendix A. Much of the Explosive Hazard Evaluation (EHE) module is prepared from existing information and knowledge of the history of the site and its surrounding environments. From this history we are able to assess that the potential for Chemical Warfare Material (CWM) at Camp Minden were not likely present. Limited site specific data has been obtained to fully assess the Health Hazard Evaluation (HHE) Module. While site wide groundwater controls/restrictions are in place at Camp Minden, further evaluation is pending to fully characterize the human and ecological hazards.

Recommendations

The SI included the performance of a survey of the T-7 area to determine if munitions were present in the surface and the shallow subsurface based on visual inspection of the area and the geophysical survey that was effective to a depth of up to five feet. Efforts to assess this included a visual inspection and a magnetic survey along transects to assess the presence or absence of potential munitions with the boundaries of the T-7 Area. Based on the prevalence of magnetic anomalies across the site, evidence of small pieces of metallic debris and evidence of remnant testing equipment there is sufficient evidence across the site to warrant further investigation. Based on the limited chemical data obtained during the previous investigation and the number of potential MEC still present on site, further sampling for MEC related compounds is warranted to adequately address human and ecological risks. As part of the future effort, a MRS-prioritization summary should be developed to assess the potential explosive safety and environmental hazards at the T-7 Area that should include stakeholder input. Furthermore, based on these findings, continuation of land use restrictions and controlled access should continue.

1.0 INTRODUCTION

This Site Inspection (SI) Report presents the results of the SI activities conducted at Test Area 7 (T-7) at the Louisiana Army National Guard (LAARNG) facility located on Camp Minden, Doyline, Louisiana. Camp Minden is also known as the former Louisiana Army Ammunition Plant (LAAP) that was originally acquired by the United States (U.S.) Government in 1941 for the purpose of ammunition production. The facility operated off and on until 1993 when production of ammunition was terminated and the facility officially put on standby status. In 2004, the US Army conveyed the property to the State of Louisiana provided that at least 13,500 acres of property are used for military training. In 2005, the remaining 1,449 acres retained by the Army were transferred to the LAARNG and the LAAP was renamed Camp Minden.

1.1 PROJECT AUTHORIZATION

Stell Environmental Enterprises, Inc. (SEE) was contracted by the U.S. Army Corps of Engineers (USACE) to perform a MMRP SI at two Munitions Response Sites (MRS) at the LAARNG, Camp Minden, located in Doyline, Louisiana (Figure 1-1). This work is being performed under Contract No. W9126G-13-P-0171. The SI Report for the CPG Kickout Area will be provided at a later date under a separate cover.

1.2 PURPOSE, SCOPE, AND OBJECTIVES OF THE SITE INVESTIGATION

Congress established the MMRP under the Defense Environmental Restoration Program (DERP) to address unexploded ordnance (UXO), discarded military munitions (DMM), and munitions constituents (MC) located on current and formerly used defense sites (FUDS). MMRP eligible sites include areas other than operational ranges where UXO, DMM, or MC are known or suspected and the release occurred prior to 30 September 2002. The objective of the SI was to assess hazards posed by MEC at the T-7 site.

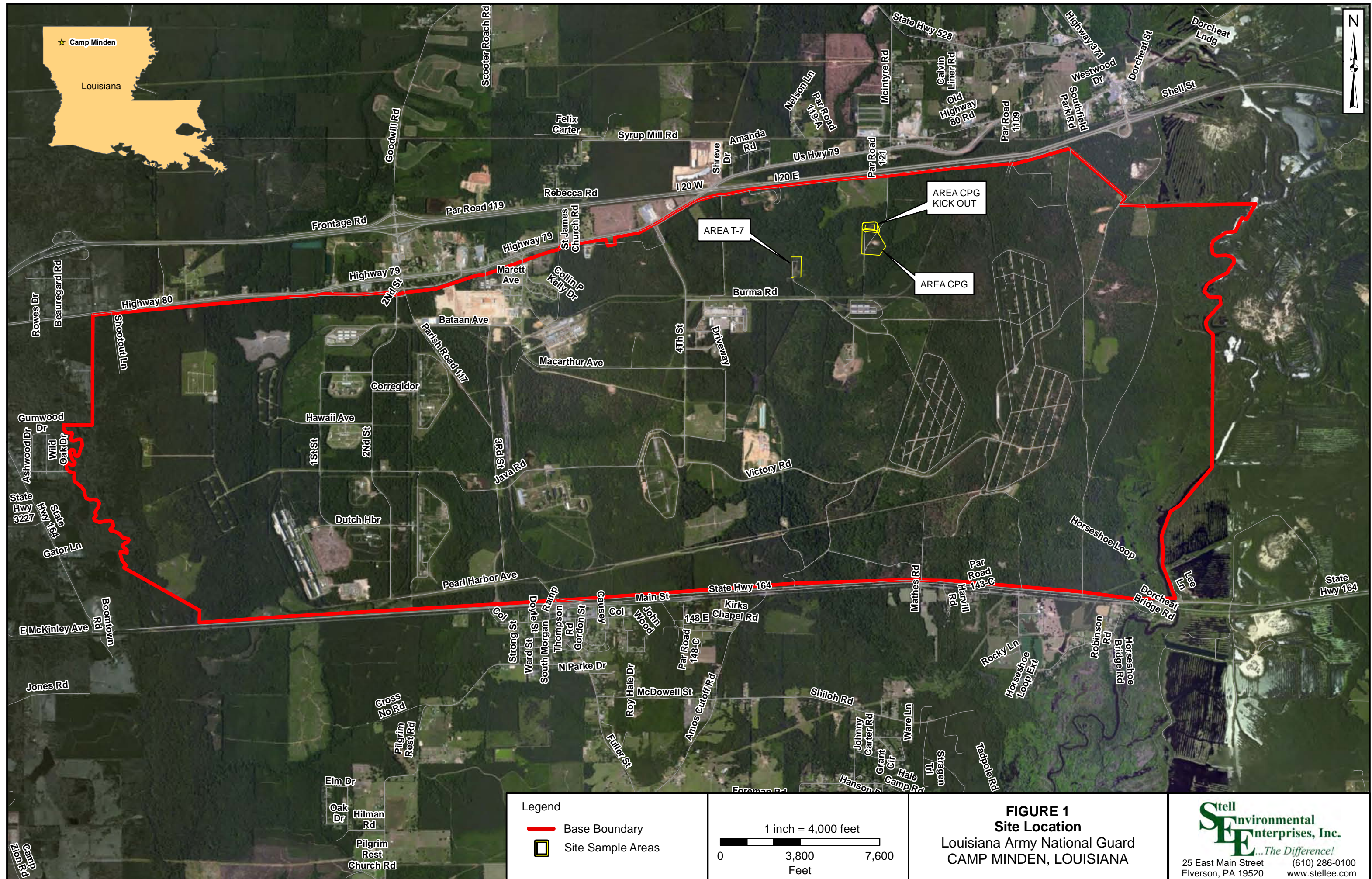
The objective of the SI was to determine if MEC exist at the T-7 Munitions Response Site (MRS) related to former Department of Defense (DoD) operations (Figure 1-2). An additional objective of the SI is to collect the additional data necessary to complete the Munitions Response Site Prioritization Protocol (MRSP). The SI was conducted in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the National Oil and Hazardous Substances Contingency Plan. The technical approach for this SI was based on the Camp Minden SI Work Plan (SEE, 2013) and the Data Item Description (DID) Military Munitions Response Program (MMRP) -09-0001.

1.3 MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL

The Munitions Response Site Prioritization Protocol was published as a rule on October 5, 2005 (70 FR 58028). This rule implements the requirement established in section 311(b) of the National Defense Authorization Act for Fiscal Year 2002 for the DoD to assign a relative priority for munitions responses to each location in the DoD's inventory of defense sites known or suspected of containing unexploded ordnance (UXO), discarded military munitions, or MC (70 FR 58016).

MRSP scoring sheets for the munitions response sites (MRSs) identified in this SI Report are included in Appendix A. The MRSP scoring will be updated on an annual basis to incorporate new information.

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TEST AREA T-7



Burma Rd

Range Boundary

Source: Esri, DigitalGlobe, GeoEye, I-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

1 inch = 300 feet

0 300 600 Feet

FIGURE 1-2 Test Area 7 (T-7)

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2.0 PROPERTY DESCRIPTION AND HISTORY

The setting, history, and use of Camp Minden are described in the following sections.

2.1 PROJECT LOCATION AND DESCRIPTION

Camp Minden is located approximately 22 miles east of Shreveport, Louisiana on State Route 80, and consists of approximately 15,010 acres. The former LAAP commercial property occupies 1,284 acres and consists of 703 buildings. There are approximately 13,219 acres of operational range area at Camp Minden. The operational range area, which consists of 18 ranges, is currently used by the LAARNG to provide tactical training for Army National Guard troops (Shaw, 2006). The LAARNG uses the property to train and house soldiers. Many former areas are leased to various tenants for the production of flares, ammunition, mine boosters, black powder, and to demilitarize munitions. The non-operational area is composed of 27 small parcels scattered throughout the west-central portion of the installation. Current training at Camp Minden includes both non-live-fire and live-fire activities. Non-live-fire activities are conducted within Camp Minden's two small arms ranges that are located in the eastern half of the installation. In addition to current ammunitions use, portions of Camp Minden were historically utilized for the production and testing of medium and large caliber munitions (Shaw, 2006).

2.2 NEARBY POPULATION

2.2.1 CENTER OF ACTIVITY

Camp Minden is located in portions of Bossier and Webster Parishes, Louisiana.

2.2.2 POPULATION DENSITY

The population density for the parishes contained in Camp Minden is as follows:

Table 2-1: Parish Population Density

Parish	Area (square miles)	Population	Population Density (persons/square mile)
Bossier	840.06	116,979	139.3
Webster	593.03	41,207	69.5

Source: U.S. Census Bureau, 2010

The cities of Shreveport and Bossier City are located approximately 22 miles west of LASP and the town of Minden is located about two miles northeast of LAAP. Haughton is located within two miles of the western boundary of LAAP. The community of Doyline is located on U.S. Highway 164 on the southern boundary and the community of Goodwill is located on U.S. Highway 80 on the northern boundary (Shaw, 2006).

2.3 SITE HISTORY

2.3.1 HISTORIC LAND USE

Camp Minden was initially developed as the LAAP in 1941 when the U.S. government acquired the land. The Silas Mason Company was contracted to build the LAAP for the production of ammunition, mines, grenades, and fuzes to use during World War II (WWII). Eight ammunition production lines were initially constructed at the facility by May 1942. Near the end of WWII, an ammonium nitrate graining plant was added to the production capabilities. During WWII, 65 different items of ammunition were produced at the LAAP. Ammunition production ceased in

August 1945 at the conclusion of WWII. In November 1945, the federal government released Silas Mason Company from responsibility for the plant and placed it in standby status.

Remington Rand, Inc. reactivated the installation under a government contract in February 1951 to produce ammunition for the Korean Conflict. During the Korean Conflict, the LAAP produced antitank mines, antipersonnel mines, fuzes, boosters, and conventional projectiles ranging in size from 57 millimeters (mm) to 155 mm. Employment at the facility during the Korean Conflict peaked at over 5,000 employees in 1953. Production was suspended in February 1958 and LAAP was again placed in standby status.

In September 1961, Sperry Rand, Inc. reopened LAAP and began production of ammunition for the Vietnam Conflict. Items that were produced included 2.75-inch warheads, 4.2-inch mortars, and 155 mm projectiles.

The contract was transferred from the Sperry Rand Corporation to the Thiokol Corporation in 1975. From 1975 to 1989, production included M692, 4.2-inch mortars; M107 B, M73 grenade assemblies; 2.75-inch warheads; guided missile high explosives; 155 mm metal parts switched from M483 to M864; M825 smoke; and M687 binary items. Thiokol stopped ammunition production in 1994 and Valentec, Inc. assumed the contract in 1997 and currently is in charge of the contract (Shaw, 2006).

2.3.2 CURRENT LAND USE

Legislation was enacted in 2004 to convey the LAAP property from the Army to the State of Louisiana, provided the majority of the property is used for military training and the remaining property is used for commercial or industrial activities. LAAP was transferred to the State of Louisiana in January 2005 and renamed Camp Minden. The State of Louisiana Military Department accepted the property on behalf of the State of Louisiana. The State of Louisiana assumed the rights and responsibilities of the Army under the Armaments Retooling Manufacturing Support agreement between the Army and the installation use contractor. Even though the property has been transferred to the state, all environmental remediation responsibilities remained with the Army until 2011 (LAAP, 2007)

Camp Minden is currently divided into two areas consisting of military training property and commercial property. The military training property has no inhabited buildings and is primarily made up of undeveloped woodland and wetlands, bunkers, burning grounds, and test areas. The commercial property includes the administration area, general storage and maintenance areas, load/assemble/pack line storage facilities, and the sewage treatment plant. The commercial property also includes the T-7 Area.

2.4 T-7 AREA SITE DESCRIPTION

The T-7 Area, also known as BG-7, was constructed in the 1950s within the northeastern portion of the LAAP. This area occupies approximately 6.92 acres. Access to the site is currently controlled via fencing surrounding the T-7 perimeter. The area is relatively level with a single road providing access into the site. The majority of the property contains heavily vegetative cover consisting predominately of pine trees. Several debris piles, similar to the one shown in Photographs 9 and 11 in the Photographic Log (Appendix A) are present across the site. The debris piles are comprised of soil, vegetation, wood, concrete rubble, and metal debris. Several remnant features are present throughout the site, primarily in the northeast corner of the property within the wooded pines. Features include concrete blocks and slabs, metal poles and plates,

utility boxes, and electronic monitoring stations at the perimeter of the testing area. The test area was actively used from the 1950s through the 1990s for testing, detonation, and burning of munitions. Examples of material destroyed/tested included:

- Section M107, high explosive (HE) projectiles;
- BLU-4 A/B bomb grenade for M449 projectiles;
- Grenade for M444 projectiles;
- M158 bomb fuze; and
- M159 bomb fuze.

In 2010, two areas at Training Area – LT, also known as T-7, were identified to contain unexploded munitions that were remnants from testing and burning of munitions when the plant was active. Subsequent to these findings, the site was placed in a non-operational status to allow for munitions removal and control/limit the use of the property. Munitions were unearthed while performing grading operations during a 2011 training exercise and all further training in this area was halted. The round was removed by Explosive Ordnance Disposal (EOD) personnel for disposal. The desired future use for this site is to support various training activities including intrusive activities such as EOD training.

2.5 TOPOGRAPHY

The Camp Minden property includes three major landform types: dissected uplands in the east, slightly rolling low land in the west, and the ancient Red River floodplain through the central portion of the installation. The elevation varies from 145 feet (ft) above mean sea level (amsl) near Bayou Dorcheat in the east to 225 ft amsl in the central portion of the installation to 180 ft amsl at Clarke Bayou in the west. The elevation at the center of the T-7 Area is 188 ft amsl. The topography of the site is primarily level except in areas where eroded as a result of surface drainage to the tributaries of the Red River (URS Corporation [URS], 2010).

2.6 CLIMATE AND VEGETATION

The climate of northwest Louisiana is classified as subtropical-humid and continental with hot summers and cool winters. During summer, the prevailing southerly winds provide a moist subtropical climate; however, the pressure distribution occasionally results in westerly or northerly winds and hot, dry weather. During winter, the area is alternatively subject to moist subtropical air and dry, cold air, which sometimes results in extreme temperature changes (Dougherty Sprague Environmental, Inc. [DSE] 2005).

The average temperature during summer is 81 degrees Fahrenheit (°F). August is the hottest month with an average temperature of 83°F. The average temperature during winter is 47°F. January is the coldest month with an average temperature of 45°F. Temperatures of 90°F or higher occur an average of 103 days each year. Temperatures of 32°F or lower occur an average of 43 days per year. The relative humidity is 60 percent or higher more than 280 days per year and is 40 percent or lower less than 26 days per year (DSE, 2005).

The average annual rainfall at Minden, Louisiana, is approximately 55 inches. Monthly rainfall averages approximately five inches during autumn and winter and approximately four inches during spring and summer. The wettest months are November and January; the least amount of rain falls during August and September. During winter, over 98 percent of precipitation is rain;

an average of only two inches of snow (0.2 inches of precipitation) falls per year. The evaporation rate is approximately 39 inches per year. A storm event that statistically occurs only once every 25 years theoretically produces 12.44 inches of rain within 24 hours (DSE, 2005).

2.7 GEOLOGY AND SOILS

The geology of Camp Minden is made up of continental and marine deposits that have filled the Gulf basin. The geologic units underlying the site from the surface to about 1,000 ft consist of unconsolidated sediments ranging in age from Eocene to Pleistocene. Pleistocene terrace deposits cover the entire surface of LAAP. The terrace sediments are floodplain and river deposits from the ancestral Red River that generally grade from clays and silts at the surface to sand and gravel at the bottom (SA, 2000). The Terrace deposits are divided into the Upper Terrace and Lower Terrace sands (URS, 2010). These river deposits can vary laterally over short distances, which may help to explain the limited movement of contaminants in groundwater. The river deposits are horizontal and overlie the Eocene deposits that dip to the northeast, forming an angular unconformity between the Pleistocene and Eocene deposits (SA, 2000).

The youngest Eocene age unit is the Sparta Formation that subcrops on the northeastern portion of the site. It is a major source of groundwater for the city of Minden to the northeast, but is not a well-developed aquifer on Camp Minden. The Eocene age Cane River Formation subcrops in the central portion of Camp Minden and is a marine shale. It acts as a confining layer and prevents the vertical flow of groundwater and contaminants. The terrace deposits on the western end of the Camp Minden overlie the Wilcox Formation, which is a non-marine shale with some sand and lignite. It is estimated that only 20 to 30 percent of the Wilcox Formation is sand. Camp Minden's water supply is from wells installed in the Wilcox (SA, 2000).

The shallow deposits at LAAP typically consist of unconsolidated Pleistocene basal sand and gravel that grade upward to silts and clays. The U.S. Department of Agriculture (USDA), Soil Survey of Webster Parish, Louisiana indicates that there are four major soil series at LAAP which are as follows: Kolin silt loam, Wrightsville silt loam, Guyton-Quachita silt loam, and the Gore silt loam. The Kolin, Wrightsville, and Gore complexes are characterized as upland soil types. At the T-7 Area the predominant soil series is the Kolin silty loams, which consist of deep, moderately well drained, slowly permeable, acidic soils (USDA, 2014).

2.8 HYDROGEOLOGY

The hydrology of Camp Minden is composed of several aquifers and confining units and includes, from deepest to shallowest, the Wilcox Sand Aquifer, Cane River Aquitard, Sparta Sand Aquifer, and the Pleistocene Terrace Deposits/Holocene Alluvium Aquifer. The deeper Wilcox Aquifer can be further divided into three distinct aquifers, each with different hydraulic characteristics, called the Lower Wilcox, Middle Wilcox, and Upper Wilcox-Carizzo Aquifers. The systems are described below in ascending order.

The shallowest of the Wilcox Aquifer, the Upper Wilcox and overlying Carizzo Sand Formation of the Claiborne Group, are hydraulically connected, have similar hydrogeologic characteristics, and are considered one hydrologic unit. Recharge comes from precipitation along outcrops and infiltration from the overlying alluvium. Locally, the aquifer is the primary source of drinking water for the Camp Minden and the nearby communities of Doyline and Goodwill. The groundwater flow direction in the aquifer is generally to the northeast but may be locally influenced by the facility's nine supply wells located west of the main gate to Camp Minden and

the injection of oil field brines into the deeper zone of the Wilcox Aquifer. Prior to the development of groundwater resources in the area, the flow direction was to the east.

The Cane River Formation is an extensive regional aquitard that hydraulically separates the underlying Upper Wilcox-Carizzo Aquifer from the overlying Sparta Sand Aquifer. The Sparta Sand Aquifer is equally extensive and considered a regional aquifer that serves as the primary source of drinking water to the areas east and northeast of Camp Minden. The groundwater flow direction for this aquifer is generally to the northeast. Recharge to the Sparta Sand Aquifer occurs mainly through infiltration of precipitation at outcrop areas, and infiltration of the overlying terrace alluvium.

The Pleistocene terrace deposits and younger Holocene alluvium are hydraulically connected and typically behave as one unit. This aquifer is also connected to surface water bodies, where present, and to a lesser degree with underlying aquifers. Recharge is from infiltration of precipitation and associated with leakage from underlying aquifers.

At Camp Minden, the three aquifers have been grouped into two groundwater systems referred to as the shallow and the deep groundwater systems. The shallow groundwater system includes the Pleistocene terrace deposits, younger Holocene alluvium, and the Sparta Sands. The monitoring wells located on the facility are all installed within the shallow groundwater system. The shallow groundwater system is hydraulically separated from the deep groundwater by the clays, silts, and shale of the Cane River Formation that act as an aquitard such that the shallow terrace aquifer system is not hydraulically connected to the deeper Wilcox Aquifer (e2M, 2005)

2.9 SURFACE WATER HYDROLOGY

Geographically, LAAP is located in the Red River Basin. All surface water within LAAP leaves the facility by two bayous and two creeks. Clark Bayou forms the western boundary of LAAP and Bayou Dorcheat forms the eastern boundary. Caney Creek drains the western portions of LAAP into Clark Bayou. Boone Creek and its tributaries drain the eastern and central portions of LAAP and flow into Bayou Dorcheat. A man-made unnamed ditch system that drains the western portions of the facility discharges into Clarke Bayou near the southern LAAP boundary. All of the waterways discharge into Lake Bistineau located approximately 11 miles southeast of LAAP (Shaw, 2007).

2.10 PREVIOUS INVESTIGATIONS FOR MC AND MEC

The T-7 Area soil was included in the U.S. Environmental Protection Agency (USEPA) Operating Unit (OU)-04 Record of Decision (ROD) that selected no further action (NFA) as a remedy (Shaw, 2006). Contaminants identified in the surface and subsurface soil at T-7 include 4-Amino-2,6-dinitrotoluene (4-AM-2,6-DNT), benzo(a)pyrene, and benzo(b)fluranthene. The human health risk assessment indicated no unacceptable risks under the industrial use scenario. The expanded ecological risk assessment indicated that no remedial action was necessary for the protection of ecological receptors. Therefore, the selected remedy for the soils at T-7 was NFA with a deed restriction. The deed restriction states that the property can only be used for commercial/industrial and military purposes (Shaw 2006).

In addition, the T-7 Area groundwater was included in the USEPA OU-05 ROD that selected monitored natural attenuation with long term monitoring and institutional controls (IC) (Shaw 2007). Contaminants identified in the shallow groundwater at T-7 include the explosives octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), hexahydro-1,3,5-trinitro-1,3,5-triazine

(RDX), 2,4,6-trinitrotoluene (TNT), 2,4,6-trinitrophenyl-N-methylnitramine (tetryl), the volatile organic compounds tetrachlorethylene (PCE), 1,1-dichloroethene, and trichloroethene (TCE), and the metal lead. Based on the risk and impact characterization results from the groundwater concentrations at the study areas, it was determined that groundwater at LAAP posed a potential for future residential risks from groundwater exposure. Institutional controls were placed on the property that prohibit the use of the shallow groundwater for drinking and prevent the installation of wells in the shallow groundwater.

3.0 FIELD WORK

The T-7 Area was investigated from January 15 through January 16, 2014 with three UXO technicians and two field support staff.

3.1 GEOPHYSICAL INVESTIGATION PLAN

An analog magnetometer-assisted site reconnaissance (analog geophysics) along 24 semi-fixed transects was performed to assess the presence or absence of MEC at the T-7 Area. The transects ran in a north-south direction and generally extended from immediately inside the southern property boundary to immediately inside the northern property boundary (Figure 4.1). The geo-survey team walked around any buildings or heavy thick impenetrable vegetation that was within the transect path while continuing to gather information. The survey team used a machete to clear vegetation as needed to traverse small sections of the transects.

A Schonstedt GA-52cx Magnetic Locator was used to characterize potential MEC distribution and locate potential burial or disposal pits or trenches containing metal or metallic debris in the investigation area. The transects were surveyed using Wide Area Augmentation System Global Positioning System (GPS), Trimble GeoExplorer Series.

The five-man field survey crew performed the subsurface analog metal detection survey in real time. UXO crews consisting of one UXO Technician I and two UXO Technician IIIs, meeting the requirements listed in the Department of Defense Explosive Safety board Technical Paper 18, detected and mapped anomaly locations along the transect paths. Twenty-three transect lines were pre-programmed into the Trimble GPS unit. Pre-programming of the transect lines was useful in guiding field crews along transects due to the heavy vegetation and tree cover present throughout the T-7 Area to ensure that the site was thoroughly investigated. In cases where the transect line could not be directly followed due to heavy vegetation coverage that could not easily be cleared, the field team diverted around to return to it when vegetation cleared to allow access. The location of detected anomalies was logged using the Trimble GPS unit with sub-foot accuracy. The geographical location and any observations were collected in the field and logged into the Trimble GPS unit. The Trimble GPS unit needs at least four to five satellites to plot each geographical location with sub-foot accuracy. In cases where Trimble satellite coverage was interrupted due to tree canopy cover, a handheld Magellan eXplorist series GPS unit was used to collect anomaly data with slightly lower accuracy of ten feet; the Magellan unit only needs three satellites to function.

The survey team covered a 3- to 5-foot wide path along the proposed transect while surveying with handheld geophysical instruments and tallied the number of anomalies along each transect segment. The survey team recorded the number of anomalies along each transect with the GPS unit. The transect path was conspicuously marked with bio-degradable flagging tape affixed to trees/brush. Every subsurface anomaly detected along the transects using the Schonstedt detector was marked with pin flags until the location of the anomaly was surveyed by the GPS unit. This SI did not include or require MEC clearance activities. The maximum depth of the survey was approximately five feet depending on the size and metallic qualities of the anomaly.

3.2 FIELD DOCUMENTATION

The survey team maintained a field log book during field activities that included the GPS coordinates of the anomalies. The survey team also collected photographic documentation (Appendix A) of areas where the survey team could not traverse due to vegetation, debris piles,

and any metal fragments that could be observed on the surface. In addition, the survey data tracking and projects maps were reviewed and updated each day.

4.0 MEC EVALUATION

4.1 FIELD OBSERVATIONS AND HISTORICAL EVIDENCE OF MEC

Munitions were unearthed associated with land clearing efforts during a 2011 training exercise and subsequent training in this area was immediately halted. The round was removed by EOD personnel for disposal and the site restricted from further training efforts. The planned long term objective for this site is to evaluate munitions response alternatives to stabilize or eliminate hazards to human health or the environment, whether physical or chemical in nature to restore the property to a usable status and return the area for use as an EOD training area.

The field team completed the geophysical survey of a total of 3.5 miles of transects within the T-7 Area (Figure 4-1). Ninety-four anomalies were detected during execution of the magnetic survey (Figure 4-2). Of these, 84 were identified as individual anomalies with individual registers of magnetic material and ten areas were identified as clusters containing multiple subsurface registers of magnetic material (Photographs 5, 13, and 15). Eleven debris piles were mapped during performance of this SI (Photographs 8 through 11). The debris piles are assumed to be areas of concern due to the presence of larger amounts of metallic material. An attempt to visually inspect each anomaly, anomaly cluster, or debris pile for the presence of MEC was performed when anomalies were identified. No digging was performed. The visual survey portion of this effort did not indicate noticeable munitions debris at the surface. Where anomalies were likely associated with buried utilities, piping or other infrastructure, they were noted but eliminated from the anomaly findings as MEC. These anomalies are noted as linear anomalies on Figure 4-2.

4.2 MEC RISK ASSESSMENT

Use of the T-7 Area is currently restricted prohibiting its use for training activities, forestry or other uses. Access is controlled for maintenance and other site workers. The future use of the site will include training activities in support of the Camp Minden mission. There are no current plans that would include residential, commercial, or light industrial uses. Receptors at the T-7 Area include authorized installation personnel (i.e., base maintenance workers and construction workers), authorized contractors and visitors, and trespassers. Camp Minden is located in the Upper West Gulf Coastal Plain Ecoregion. Woodlands cover approximately two-thirds of the available land on the installation. In general, the T-7 area is covered by pine forest and open grassy fields. The current degree of disturbance at T-7 is low. Previous ecological resource evaluations did not identify critical habitats for threatened or endangered species, sensitive ecosystems such as wetlands or breeding grounds.

The area is vacant and is currently not being used as a training site. Besides the remnant bunker, the area predominantly consists of wooded areas, shrubs, and clearings with tall grasses and cover, and various debris piles. While no MEC was identified during the SI, sufficient evidence was obtained to substantiate the restrictions for the site, not the least of which is the historic confirmation of MEC which required subsequent removal by EOD for proper disposal. The potential is further substantiated by the numerous metallic anomalies identified during the SI indicating the presence of buried metallic objects. Prior MEC discoveries were made during land clearing and land disturbance activities that could indicate MEC is present below the surface. The presence of multiple debris piles are also of concern as they may contain MEC that would not be recognized without intrusive techniques. While evidence has verified the presence

of potential MEC, no MEC was observed during the SI that would lead to a time critical removal. Based on these anomalies further investigation is warranted.

The human health risk assessment, completed under a previous investigation, indicated no unacceptable risks under an industrial use scenario and expanded ecological risk assessment indicated that no remedial action was necessary for the protection of ecological receptors NFA with deed restriction was recommended (Shaw 2006). However, limited site specific chemical and physical data was obtained for this site during previous investigations. This limited data was used to fully characterize human and ecological risk associated with previous activities at T-7. Prior investigations indicated 4-AM-2,6-DNT, benzo(a)pyrene, and benzo(b)fluranthene constituents in surface and subsurface soil. Based on the limited chemical data obtained during the previous investigation and the number of potential MEC still present on site, further sampling for MEC related compounds is warranted to adequately address human and ecological risks as part of a RI/FS.

4.3 MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL

This section discusses application of the MRSP for the Camp Minden T-7 Area. The DoD proposed the MRSP (32 Code of Federal Regulations [CFR] Part 179) to assign a relative risk priority to each defense site in the MMRP Inventory for response activities. These response activities are based on the overall conditions at each MRA and MRS and consider various factors related to explosive safety and environmental hazards. The application of the MRSP applies to all locations:

- That are or were owned, leased to, or otherwise possessed or used by the DoD.
- That are known to or are suspected of containing MEC or MC.
- That are included in the MMRP Inventory.

In assigning a relative priority for response activities, the DoD generally considers MRAs and MRSs posing the greatest hazard as being the highest priority. In the MMRP, the MRSP priority will be one factor in determining the sequence in which munitions response actions are funded.

There are three modules used to evaluate the unique characteristics of each type of hazard:

- The Explosive Hazard Evaluation (EHE) Module addresses explosive hazards posed by UXO, DMM, and MC in high enough concentrations to pose an explosive hazard;
- The Chemical Warfare Materiel (CWM) Hazard Evaluation (CHE) Module addresses hazards associated with the effects of CWM; and
- The Health Hazard Evaluation (HHE) Module addresses chronic health and environmental hazards posed by MC and incidental non-munitions contaminants.

Each module is composed of three categories of information, called factors, that are used to assess the hazard of the UXO, DMM, or MC; how accessible the hazard is; and any receptors potentially affected by the hazard. Each factor is comprised of multiple data elements that capture MRS-specific information. The data elements classify information essential for the characterization of conditions at the MRS.

Much of the EHE module is prepared from exiting information and knowledge of the history of the site and its surrounding environments. From this history, we are also able to assess that the

potential for CWM at Camp Minden were not likely present. Limited site specific data has been obtained to fully assess the HHE Module. While site wide groundwater controls/restrictions are in place at Camp Minden, further evaluation is necessary to fully characterize the human and ecological hazards.

The MRSP worksheet tables for the T-7 Area are included in Appendix A.

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1 inch = 100 feet

0 50 100 150 200 Feet

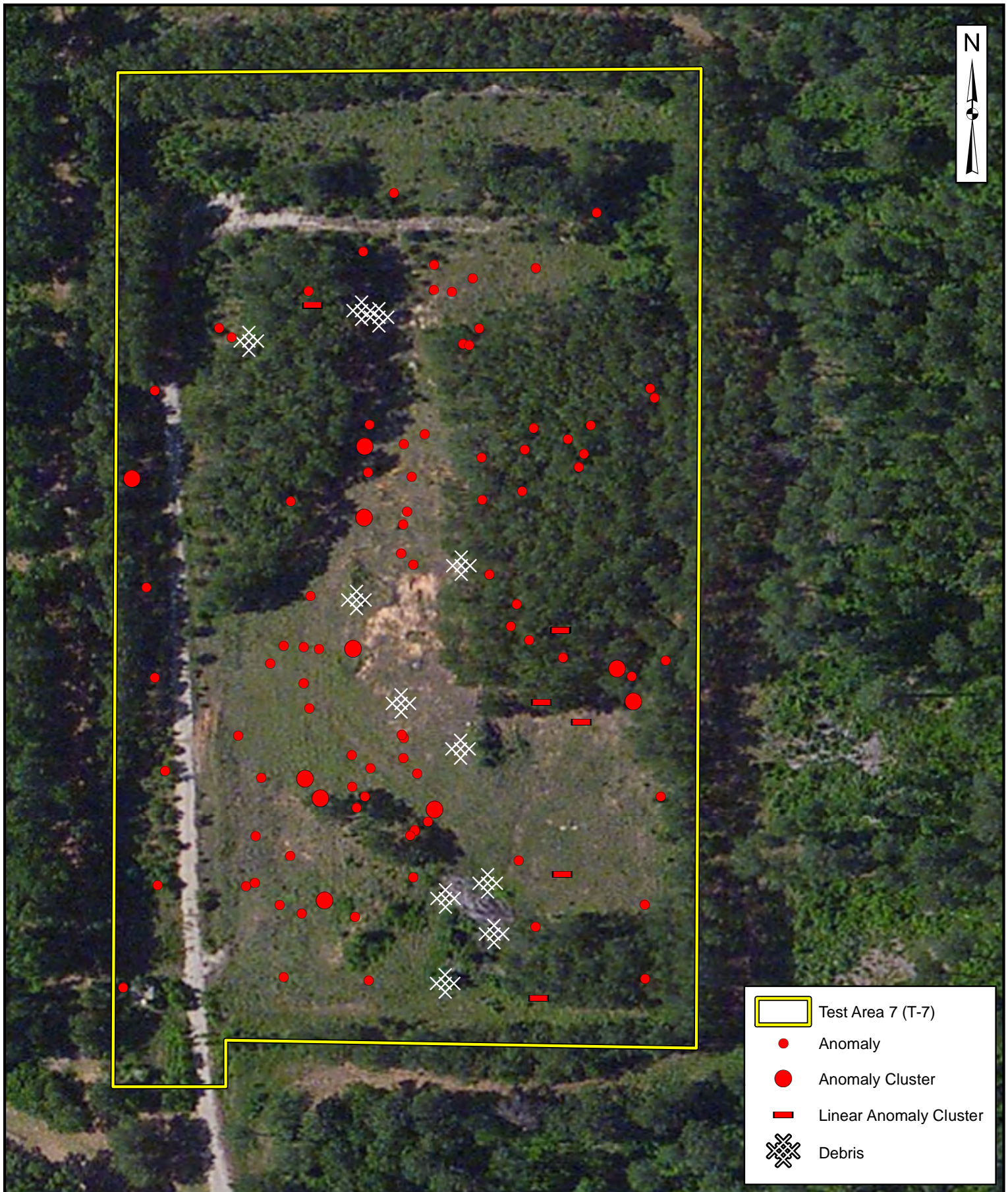
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

FIGURE 4-1
Test Area 7 (T-7)
Transect Map
 Louisiana Army National Guard
 CAMP MINDEN, LOUISIANA

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FIGURE 4-2
Test Area 7 (T-7)
Metallic Anomaly Map
 Louisiana Army National Guard
 CAMP MINDEN, LOUISIANA

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5.0 SUMMARY AND CONCLUSIONS

The primary objective of the SI was collect the appropriate amount of information to make one of the following decisions:

- Whether an RI/FS is required at a site;
- Whether an immediate response is needed; or
- Whether the site qualifies for NFA.

Based on these objectives, the following information has been developed to support further efforts:

- The land use for T-7 is currently restricted and not projected to change without further MEC clearance.
- This site is located within the confines of Camp Minden and is behind the perimeter fence for the installation so public access is restricted.
- The area is vacant and is currently idle as a result of recent MEC having been discovered.
- Besides the bunker, the area predominantly consists of an overgrown field with heavy shrubs, a few tree stands, and several debris piles.
- Ninety-four subsurface magnetic anomalies were detected during the magnetic survey. Visual inspection did not identify the presence of MEC at the surface. Since the scope of work did not include invasive investigation (i.e., no digging was performed), each of the anomalies represent unknown subsurface (buried) metallic materials. Based on historic property usage and that munitions have been previously detected within the boundary of T-7, there is a possibility the anomalies could be MEC.
- No soil sampling or groundwater sampling for MC was completed as part of this SI. Limited site specific chemical and physical data has been collected at this site as part of the USEPA OU-04 ROD to adequately address human and ecological risks as part of an RI/FS.
- While evidence has verified the presence of MEC, none was identified during this SI that would warrant the need for a time critical removal.
- For the MRSPF much of the EHE module is prepared from exiting information and knowledge of the history of the site and its surrounding environments. From this history we are also able to assess that the potential for CWM at Camp Minden were not likely present. Limited site specific data has been obtained to fully assess the HHE Module. While site wide groundwater controls/restrictions are in place at Camp Minden, further evaluation is pending to fully characterize the human and ecological hazards.

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6.0 RECOMMENDATIONS

The SI included the performance of a survey of the T-7 area to determine if munitions were present in the surface and the shallow subsurface based on visual inspection of the area and the geophysical survey that was effective to a depth of up to five feet. Efforts to assess this included a visual inspection and a magnetic survey along transects to assess the presence or absence of potential munitions with the boundaries of the T-7 Area. Based on the prevalence of magnetic anomalies across the site, evidence of small pieces of metallic debris and evidence of remnant testing equipment there is sufficient evidence across the site to warrant further investigation. Based on the limited chemical data obtained during the previous investigation and the number of potential MEC still present on site, further sampling for MEC related compounds is warranted to adequately address human and ecological risks. As part of the future effort, a MRS-prioritization summary should be developed to assess the potential explosive safety and environmental hazards at the T-7 Area that should include stakeholder input. Furthermore, based on these findings, continuation of land use restrictions and controlled access should continue.

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7.0 REFERENCES

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APPENDIX A
MRSPP Worksheet Tables

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Table A

MRS Background Information

DIRECTIONS: Record the background information below for the MRS to be evaluated. Much of this information is available from Service and DoD databases. If the MRS is located on a FUDS property, the suitable FUDS property information should be substituted. In the MRS summary, briefly describe the UXO, DMM, or MC that are known or suspected to be present, the exposure setting (the MRS's physical environment), any other incidental nonmunitions-related contaminants (e.g., benzene, trichloroethylene) found at the MRS, and any potentially exposed human and ecological receptors. If possible, include a map of the MRS.

Munitions Response Site Name: TEST AREA 7

Component:

Installation/Property Name: CAMP MINDEN

Location (City, County, State): Minden, Webster and Bossier Counties, LA

Site Name/Project Name (Project No.): CAMP MINDEN/TEST AREA 7

Date Information Entered/Updated: 5/20/2014 5:07:00 AM

Point of Contact (Name/Phone): Jerry Gaccetta (770) 421-3419

Project Phase (check only one):

<input type="radio"/> PA	<input type="radio"/> SI	<input type="radio"/> RI	<input type="radio"/> FS	<input type="radio"/> RD
<input type="radio"/> RA-C	<input type="radio"/> RIP	<input type="radio"/> RA-O	<input type="radio"/> RC	<input type="radio"/> LTM

Media Evaluated (check all that apply):

<input type="radio"/> Groundwater	<input type="radio"/> Sediment (human receptor)
<input type="radio"/> Surface soil	<input type="radio"/> Surface Water (ecological receptor)
<input type="radio"/> Sediment (ecological receptor)	<input type="radio"/> Surface Water (human receptor)

MRS Summary:

MRS Description: Describe the munitions-related activities that occurred at the installation, the dates of operation, and the UXO, DMM or MC known or suspected to be present. When possible, identify munitions, CWM, and MC by type:

Camp Minden, formerly the Louisiana Army Ammunition Plant operated from mid 1950s to 1990 for testing and burning of munitions. The T-7 Area, also known as BG-7, was constructed in the 1950s within the northeastern portion of the LAAP. This area occupies approximately seven acres. The test area was actively used from the 1950s through the 1990s for testing, detonation, and burning of munitions. Examples of material destroyed/tested included:

- Section M107, high explosive (HE) projectiles;
- BLU-4 A/B bomb grenade for M449 projectiles;
- Grenade for M444 projectiles;
- M158 bomb fuze; and
- M159 bomb fuze.

Source: URS Corporation (URS). 2010. Environmental Condition of Property Report Former Louisiana Army Ammunition Plant Doyline, Louisiana. November. Section 3.3.4.36

Description of Pathways for Human and Ecological Receptors:

Site has not been fully characterized.

Description of Receptors (Human and Ecological):

Access to T-7 is controlled for maintenance and other site workers. The future use of the site will include training activities in support of the Camp Minden mission. There are no current plans that would include residential, commercial, or light industrial uses. Receptors at the T-7 Area include authorized installation personnel (i.e., base maintenance workers and construction workers), authorized contractors and visitors, and trespassers. Camp Minden is located in the Upper West Gulf Coastal Plain Ecoregion. Woodlands cover approximately two-thirds of the available land on the installation. In general, the T-7 area is covered by pine forest and open grassy fields. The current degree of disturbance at T-7 is low. Previous ecological resource evaluations did not identify critical habitats for threatened or endangered species, sensitive ecosystems such as wetlands or breeding grounds.

Table 1

EHE Module: Munitions Type Data Element Table

DIRECTIONS: Below are 11 classifications of munitions and their descriptions. Circle the scores that correspond with all the munitions types known or suspected to be present at the MRS.

Note: The terms practice munitions, small arms ammunition, physical evidence, and historical evidence are defined in Appendix C of the Primer.

Classification	Description	Score
Sensitive	<ul style="list-style-type: none"> u UXO that are considered likely to function upon any interaction with exposed persons (e.g., submunitions, 40mm high-explosive [HE] grenades, white phosphorus [WP] munitions, high-explosive antitank [HEAT] munitions, and practice munitions with sensitive fuzes, but excluding all other practice munitions). u Hand grenades containing energetic filler. u Bulk primary explosives, or mixtures of these with environmental media, such that the mixture poses an explosive hazard. 	30
High explosive (used or damaged)	<ul style="list-style-type: none"> u UXO containing a high-explosive filler (e.g., RDX, Composition B), that are not considered "sensitive." u DMM containing a high-explosive filler that have: <ul style="list-style-type: none"> n Been damaged by burning or detonation n Deteriorated to the point of instability. 	<u>25</u>
Pyrotechnic (used or damaged)	<ul style="list-style-type: none"> u UXO containing a pyrotechnic fillers other than white phosphorous (e.g., flares, signals, simulators, smoke grenades). u DMM containing pyrotechnic fillers other than white phosphorous (e.g., flares, signals, simulators, smoke grenades) that have: <ul style="list-style-type: none"> n Been damaged by burning or detonation n Deteriorated to the point of instability. 	20
High explosive (unused)	<ul style="list-style-type: none"> u DMM containing a high explosive filler that: <ul style="list-style-type: none"> n Have not been damaged by burning or detonation n Are not deteriorated to the point of instability. 	15
Propellant	<ul style="list-style-type: none"> u UXO containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). u DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor) that are: <ul style="list-style-type: none"> n Damaged by burning or detonation n Deteriorated to the point of instability. 	15
Bulk secondary high explosives, pyrotechnics, or propellant	<ul style="list-style-type: none"> u DMM containing mostly single-, double-, or triple-based propellant, or composite propellants (e.g., a rocket motor). u DMM that are bulk secondary high explosives, pyrotechnic compositions, or propellant (not contained in a munition), or mixtures of these with environmental media such that the mixture poses an explosive hazard. 	10
Pyrotechnic (not used or damaged)	<ul style="list-style-type: none"> u DMM containing a pyrotechnic fillers (i.e., red phosphorous), other than white phosphorous filler, that: <ul style="list-style-type: none"> n Have not been damaged by burning or detonation n Are not deteriorated to the point of instability. 	10
Practice	<ul style="list-style-type: none"> u UXO that are practice munitions that are not associated with a sensitive fuze. u DMM that are practice munitions that are not associated with a sensitive fuze and that have not: <ul style="list-style-type: none"> n Been damaged by burning or detonation n Deteriorated to the point of instability. 	5
Riot control	<ul style="list-style-type: none"> u UXO or DMM containing a riot control agent filler (e.g., tear gas). 	3
Small arms	<ul style="list-style-type: none"> u Used munitions or DMM that are categorized as small arms ammunition [Physical evidence or historical evidence that no other types of munitions (e.g., grenades, subcaliber training rockets, demolition charges) were used or are present on the MRS is required for selection of this category.] 	2
Evidence of no munitions	<ul style="list-style-type: none"> u Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present. 	0
MUNITIONS TYPE	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	<u>25</u>
DIRECTIONS: Document any MRS-specific data used in selecting the <i>Munitions Type</i> classifications in the space provided.		

Previous investigations at T-7 identified unexploded munitions that were remnants from testing and burning of munitions when the plant was active. Munitions were subsequently unearthed while performing grading operations during a 2011 training exercise and all further training in this area was halted. The round was removed by Explosive Ordnance Disposal (EOD) personnel for disposal. Soource: Draft Site Inspection Report, CPG Test Area 7, February, 2014 prepared by Stell Enterpirses, Inc.

Table 2

EHE Module: Source of Hazard Data Element Table

DIRECTIONS: Below are 11 classifications describing sources of explosive hazards. Circle the scores that correspond with all the sources of explosive hazards known or suspected to be present at the MRS.

Note: The terms former range, practice munitions, small arms range, physical evidence, and historical evidence are defined in Appendix C of the Primer.

Classification	Description	Score
Former range	<ul style="list-style-type: none"> The MRS is a former military range where munitions (including practice munitions with sensitive fuzes) have been used. Such areas include impact or target areas and associated buffer and safety zones. 	10
Former munitions treatment (i.e., OB/OD) unit	<ul style="list-style-type: none"> The MRS is a location where UXO or DMM (e.g., munitions, bulk explosives, bulk pyrotechnic, or bulk propellants) were burned or detonated for the purpose of treatment prior to disposal. 	<u>8</u>
Former practice munitions range	<ul style="list-style-type: none"> The MRS is a former military range on which only practice munitions without sensitive fuzes were used. 	6
Former maneuver area	<ul style="list-style-type: none"> The MRS is a former maneuver area where no munitions other than flares, simulators, smokes, and blanks were used. There must be evidence that no other munitions were used at the location to place an MRS into this category. 	5
Former burial pit or other disposal area	<ul style="list-style-type: none"> The MRS is a location where DMM were buried or disposed of (e.g., disposed of into a water body) without prior thermal treatment. 	5
Former industrial operating facilities	<ul style="list-style-type: none"> The MRS is a location that is a former munitions maintenance, manufacturing, or demilitarization facility. 	4
Former firing points	<ul style="list-style-type: none"> The MRS is a firing point, where the firing point is delineated as an MRS separate from the rest of a former military range. 	4
Former missile or air defense artillery emplacements	<ul style="list-style-type: none"> The MRS is a former missile defense or air defense artillery (ADA) emplacement not associated with a military range. 	2
Former storage or transfer points	<ul style="list-style-type: none"> The MRS is a location where munitions were stored or handled for transfer between different modes of transportation (e.g., rail to truck, truck to weapon system). 	2
Former small arms range	<ul style="list-style-type: none"> The MRS is a former military range where only small arms ammunition was used. (There must be evidence that no other types of munitions [e.g., grenades] were used or are present to place an MRS into this category.) 	1
Evidence of no munitions	<ul style="list-style-type: none"> Following investigation of the MRS, there is physical evidence that no UXO or DMM are present, or there is historical evidence indicating that no UXO or DMM are present. 	0
SOURCE OF HAZARD	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	<u>8</u>

DIRECTIONS: Document any MRS-specific data used in selecting the **Source of Hazard** classifications in the space provided.

Camp Minden is also known as the former Louisiana Army Ammunition Plant (LAAP) that was originally acquired by the United States (U.S.) Government in 1941 for the purpose of ammunition production. The T-7 Area, also known as BG-7, was constructed in the 1950s within the northeastern portion of the LAAP. This area occupies approximately seven acres. Access to the site is currently controlled via fencing surrounding the T-7 perimeter. (Draft Site Inspection Report, CPG Kickout Area, April 2014 prepared by Stell Enterprises, Inc. Section 2.4)

Table 3

EHE Module: Location of Munitions Data Element Table

DIRECTIONS: Below are eight classifications of munitions locations and their descriptions. Circle the scores that correspond with all the locations where munitions are known or suspected to be present at the MRS.

Note: The terms confirmed, surface, subsurface, small arms ammunition, physical evidence, and historical evidence are defined in Appendix C of the Primer.

Classification	Description	Score
Confirmed surface	<ul style="list-style-type: none"> Physical evidence indicates that there are UXO or DMM on the surface of the MRS. Historical evidence (i.e., a confirmed report such as an explosive ordnance disposal [EOD], police, or fire department report that an incident or accident that involved UXO 	25
Confirmed subsurface, active	<ul style="list-style-type: none"> Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS, and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM. Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena (e.g., drought, flooding, erosion, frost heave, tidal action), or intrusive activities (e.g., plowing, construction, dredging) at the MRS are likely to expose UXO or DMM. 	<u>20</u>
Confirmed subsurface, stable	<ul style="list-style-type: none"> Physical evidence indicates the presence of UXO or DMM in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed. Historical evidence indicates that UXO or DMM are located in the subsurface of the MRS and the geological conditions at the MRS are not likely to cause UXO or DMM to be exposed, in the future, by naturally occurring phenomena, or intrusive activities at the MRS are not likely to cause UXO or DMM to be exposed. 	15
Suspected (physical evidence)	<ul style="list-style-type: none"> There is physical evidence (e.g., munitions debris, such fragments, penetrators, projectiles, shell casings, links, fins), other than the documented presence of UXO or DMM, indicating that UXO or DMM may be present at the MRS. 	10
Suspected (historical evidence)	<ul style="list-style-type: none"> There is historical evidence indicating that UXO or DMM may be present at the MRS. 	5
Subsurface, physical constraint	<ul style="list-style-type: none"> There is physical or historical evidence indicating that UXO or DMM may be present in the subsurface, but there is a physical constraint (e.g., pavement, water depth over 120 feet) preventing direct access to the UXO or DMM. 	2
Small arms (regardless of location)	<ul style="list-style-type: none"> The presence of small arms ammunition is confirmed or suspected, regardless of other factors such as geological stability (There must be evidence that no other types of munitions [e.g., grenades] were used or are present at the MRS to place an MRS into this category.) 	1
Evidence of no munitions	<ul style="list-style-type: none"> Following investigation of the MRS, there is physical evidence that there are no UXO or DMM present, or there is historical evidence indicating that no UXO or DMM are present. 	0
LOCATION OF MUNITIONS	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 25).	<u>20</u>

DIRECTIONS: Document any MRS-specific data used in selecting the **Location of Munitions** classifications in the space provided.

The majority of the property contains heavily vegetative cover consisting predominately of pine trees. Several debris piles are present across the site. The debris piles are comprised of soil, vegetation, wood, concrete rubble, and metal debris. Munitions were unearthed at T-7 while performing grading operations during a 2011 training exercise. (Draft Site Inspection Report, CPG Kickout Area, April 2014 prepared by Stell Enterprises, Inc. Section 2.4)

Table 4**EHE Module: Ease of Access Data Element Table**

DIRECTIONS: Below are four classifications of barrier types that can surround an MRS and their descriptions. The barrier type is directly related to the ease of public access to the MRS. Circle the score that corresponds with the ease of access to the MRS.

Note: The term barrier is defined in Appendix C of the Primer.

Classification	Description	Score
No barrier	There is no barrier preventing access to any part of the MRS (i.e., all parts of the MRS are accessible).	10
Barrier to MRS access is incomplete	There is a barrier preventing access to parts of the MRS, but not the entire MRS.	8
Barrier to MRS access is complete but not monitored	There is a barrier preventing access to all parts of the MRS, but there is no surveillance (e.g., by a guard) to ensure that the barrier is effectively preventing access to all parts of the MRS.	<u>5</u>
Barrier to MRS access is complete and monitored	There is a barrier preventing access to all parts of the MRS, and there is active, continual surveillance (e.g., by a guard, video monitoring) to ensure that the barrier is effectively preventing access to all parts of the MRS.	0
EASE OF ACCESS	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 10).	<u>5</u>

DIRECTIONS: Document any MRS-specific data used in selecting the **Ease of Access** classifications in the space provided.

This site is located within the confines of Camp Minden and is behind the perimeter fence for the installation so public access is restricted. The t-7 Area is relatively level with a single road providing access into the site, fenced with controlled access. (Draft Site Inspection Report, CPG Kickout Area, April 2014 prepared by Stell Enterprises, Inc. Section 2.4)

Table 5

EHE Module: Status of Property Data Element Table

DIRECTIONS: Below are three classifications of the status of a property within the Department of Defense (DoD) and their descriptions. Circle the score that corresponds with the status of property at the MRS.

Classification	Description	Score
Non-DoD control	<input type="radio"/> The MRS is at a location that is no longer owned by, leased to, or otherwise possessed or used by DoD. Examples are privately owned land or water bodies; land or water bodies owned or controlled by state, tribal, or local governments; and land or water bodies managed by other federal agencies.	<u>5</u>
Scheduled for transfer from DoD control	<input type="radio"/> The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD, and DoD plans to transfer that land or water body to the control of another entity (e.g., a state, tribal, or local government; a private party; another federal agency) within 3 years from the date the Protocol is applied.	3
DoD control	<input type="radio"/> The MRS is on land or is a water body that is owned, leased, or otherwise possessed by DoD. With respect to property that is leased or otherwise possessed, DoD must control access to the MRS 24 hours per day, every day of the calendar year.	0
STATUS OF PROPERTY	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	<u>5</u>

DIRECTIONS: Document any MRS-specific data used in selecting the **Status of Property** classifications in the space provided.

Camp Minden is currently under the control of the State of Louisiana, LAARNG with controlled access to the property.

Table 6

EHE Module: Population Density Data Element Table

DIRECTIONS: Below are three classifications for population density and their descriptions. Determine the population density per square mile that most closely corresponds with the population of the MRS, including the area within a two-mile radius of the MRS's perimeter. Circle the most appropriate score.

Note: Note: Use the U.S. Census Bureau tract data available to capture the highest population density within a two-mile radius of the perimeter of the MRS.

Classification	Description	Score
> 500 persons per square mile	▫ There are more than 500 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	5
100–500 persons per square mile	▫ There are 100 to 500 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	<u>3</u>
< 100 persons per square mile	▫ There are fewer than 100 persons per square mile in the U.S. Census Bureau tract in which the MRS is located.	1
POPULATION DENSITY	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	3

DIRECTIONS: Document any MRS-specific data used in selecting the *Population Density* classifications in the space provided.

Parish Area (square miles)	Population	Population Density (persons/square mile)
Bossier 840.06	116,979	139.3
Webster 593.03	41,207	69.5

Source: U.S. Census Bureau, 2010

Table 7

EHE Module: Population Near Hazard Data Element Table

DIRECTIONS: Below are six classifications describing the number of inhabited structures near the MRS. The number of inhabited buildings relates to the potential population near the MRS. Determine the number of inhabited structures within two miles of the MRS boundary and select the score that corresponds with the number of inhabited structures.

Note: The term inhabited structures is defined in Appendix C of the Primer.

Classification	Description	Score
26 or more inhabited structures	⌞ There are 26 or more inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	5
16 to 25 inhabited structures	⌞ There are 16 to 25 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	4
11 to 15 inhabited structures	⌞ There are 11 to 15 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	<u>3</u>
6 to 10 inhabited structures	⌞ There are 6 to 10 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	2
1 to 5 inhabited structures	⌞ There are 1 to 5 inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	1
0 inhabited structures	⌞ There are no inhabited structures located up to 2 miles from the boundary of the MRS, within the boundary of the MRS, or both.	0
POPULATION NEAR HAZARD	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	3

DIRECTIONS: Document any MRS-specific data used in selecting the **Population Near Hazard** classifications in the space provided.

The nearest towns outside the Camp Minden property boundary include Doylin, south and adjacent to the installation and Goodwin, located north across State Highway 80. Within 1-mile of the buffer of the installation are approximately 2,467 residents (E2M, February 2009. Type II Work Plan Military Munitions Response Program, Munition Response Sites Remedial Investigation. Section 2.3.3.2). The town of Minden is located about two miles northeast of LAAP. Camp Minden activities also include industrial/manufacturing operations within two miles of the T-7 boundary.

Table 8

EHE Module: Types of Activities/Structures Data Element Table

DIRECTIONS: Below are five classifications of activities and/or inhabited structures and their descriptions. Review the types of activities that occur and/or structures that are present within two miles of the MRS and circle the scores that correspond with all the activities/structures classifications at the MRS.

Note: The term inhabited structure is defined in Appendix C of the Primer.

Classification	Description	Score
Residential, educational, commercial, or subsistence	Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with any of the following purposes: residential, educational, child care, critical assets (e.g., hospitals, fire and rescue, police stations, dams), hotels, commercial, shopping centers, playgrounds, community gathering areas, religious sites, or sites used for subsistence hunting, fishing, and gathering.	<u>5</u>
Parks and recreational areas	Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with parks, nature preserves, or other recreational uses.	4
Agricultural, forestry	Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with agriculture or forestry.	3
Industrial or warehousing	Activities are conducted, or inhabited structures are located up to two miles from the MRS's boundary or within the MRS's boundary, that are associated with industrial activities or warehousing.	2
No known or recurring activities	There are no known or recurring activities occurring up to two miles from the MRS's boundary or within the MRS's boundary.	1
TYPES OF ACTIVITIES/STRUCTURES	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	5

DIRECTIONS: Document any MRS-specific data used in selecting the *Types of Activities/Structures* classifications in the space provided.

Aside from the residential areas adjacent to the property, Camp Minden activities also include industrial/manufacturing operations and the LAARNG Administrative Area within two miles of the T-7 boundary.

Table 9

EHE Module: Ecological and/or Cultural Resources Data Element Table

DIRECTIONS: Below are four classifications of ecological and/or cultural resources and their descriptions. Review the types of resources present and circle the score that corresponds with the ecological and/or cultural resources present on the MRS.

Note: The terms ecological resources and cultural resources are defined in Appendix C of the Primer.

Classification	Description	Score
Ecological and cultural resources present	▣ There are both ecological and cultural resources present on the MRS.	5
Ecological resources present	▣ There are ecological resources present on the MRS.	3
Cultural resources present	▣ There are cultural resources present on the MRS.	3
No ecological or cultural resources present	▣ There are no ecological resources or cultural resources present on the MRS.	<u>0</u>
ECOLOGICAL AND/OR CULTURAL RESOURCES	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 5).	0
DIRECTIONS: Document any MRS-specific data used in selecting the <i>Ecological and/or Cultural Resources</i> classifications in the space provided.		
Previous ecological resource evaluations did not identify critical habitats for threatened or endangered species, sensitive ecosystems such as wetlands or breeding grounds. (E2M, 2007)		

Table 10
Determining the EHE Module Rating

	Source	Score	Value	
DIRECTIONS: 1. From Tables 1–9, record the data element scores in the Score boxes to the right. 2. Add the Score boxes for each of the three factors and record this number in the Value boxes to the right. 3. Add the three Value boxes and record this number in the EHE Module Total box below. 4. Circle the appropriate range for the EHE Module Total below. 5. Circle the EHE Module Rating that corresponds to the range selected and record this value in the EHE Module Rating box found at the bottom of the table. Note: An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.	Explosive Hazard Factor Data Elements			
	Munitions Type	Table 1	25	33
	Source of Hazard	Table 2	8	
	Accessibility Factor Data Elements			
	Location of Munitions	Table 3	20	30
	Ease of Access	Table 4	5	
	Status of Property	Table 5	5	
	Receptor Factor Data Elements			
	Population Density	Table 6	3	11
	Population Near Hazard	Table 7	3	
	Types of Activities/ Structures	Table 8	5	
	Ecological and /or Cultural Resources	Table 9	0	
	EHE MODULE TOTAL			74
	EHE Module Total		EHE Module Rating	
	92 to 100		A	
	82 to 91		B	
	71 to 81		C	
	60 to 70		D	
	48 to 59		E	
	38 to 47		F	
less than 38		G		
Alternative Module Ratings		Evaluation Pending		
		No Longer Required		
		No Known or Suspected Explosive Hazard		
EHE MODULE RATING		C		

Table 11**CHE Module: CWM Configuration Data Element Table**

DIRECTIONS: Below are seven classifications of CWM configuration and their descriptions. Circle the scores that correspond to all the CWM configurations known or suspected to be present at the MRS.

Note: The terms CWM/UXO, CWM/DMM, physical evidence, and historical evidence are defined in Appendix C of the Primer.

Classification	Description	Score
CWM, that are either UXO, or explosively configured damaged DMM	The CWM known or suspected of being present at the MRS is: <ul style="list-style-type: none"> ▫ CWM that are UXO (i.e., CWM/UXO). ▫ Explosively configured CWM that are DMM (i.e., CWM/DMM) that have been damaged. 	30
CWM mixed with UXO	▫ The CWM known or suspected of being present at the MRS are undamaged CWM/DMM or CWM not configured as a munition that are commingled with conventional munitions that are UXO.	25
CWM, explosive configuration that are undamaged DMM	▫ The CWM known or suspected of being present at the MRS are explosively configured CWM/DMM that have not been damaged.	20
CWM/DMM, not explosively configured or CWM, bulk container	The CWM known or suspected of being present at the MRS is: <ul style="list-style-type: none"> ▫ Nonexplosively configured CWM/DMM either damaged or undamaged ▫ Bulk CWM (e.g., ton container). 	15
CAIS K941 and CAIS K942	▫ The CWM/DMM known or suspected of being present at the MRS is CAIS K941-toxic gas set M-1 or CAIS K942-toxic gas set M-2/E11.	12
CAIS (chemical agent identification sets)	▫ CAIS, other than CAIS K941 and K942, are known or suspected of being present at the MRS.	10
Evidence of no CWM	▫ Following investigation, the physical evidence indicates that CWM are not present at the MRS, or the historical evidence indicates that CWM are not present at the MRS.	<u>0</u>
CWM CONFIGURATION	DIRECTIONS: Record <u>the single highest score</u> from above in the box to the right (maximum score = 30).	<u>0</u>

DIRECTIONS: Document any MRS-specific data used in selecting the **CWM Configuration** classifications in the space provided.

LAAAP was acquired by the US government in 1941 with the intent of constructing the Louisiana Ordnance Plant whose primary function was to load, assemble, and pack ammunition items. By 1942, eight ammunition loading lines and one ammonium nitrate graining plant were completed. The mission was expanded during the Korean conflict to include the manufacture of shell casings and metal parts for 155 millimeter (mm) projectiles. The plant operated during World War II (WWII), the Korean and Vietnam conflicts, and lastly during the Persian Gulf War producing various types of shells, aerial bombs, mines, fuzes, boosters, grenades, primers, and related munitions. Between armed conflicts, the plant was typically deactivated, although the plant was in a state of either partial or full production throughout the Vietnam conflict until the Persian Gulf War. There is no evidence that CWM was ever produced, stored, loaded, or disposed of at LAAAP. In addition, no suspect CWM materials were discovered/identified during the SI field work.

Table 20
Determining the CHE Module Rating

	Source	Score	Value	
DIRECTIONS: 1. From Tables 11–19, record the data element scores in the Score boxes to the right. 2. Add the Score boxes for each of the three factors and record this number in the Value boxes to the right. 3. Add the three Value boxes and record this number in the CHE Module Total box below. 4. Circle the appropriate range for the CHE Module Total below. 5. Circle the CHE Module Rating that corresponds to the range selected and record this value in the CHE Module Rating box found at the bottom of the table. Note: An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more data elements, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.	CWM Hazard Factor Data Elements			
	CWM Configuration	Table 11	0	0
	Sources of CWM	Table 12		
	Accessibility Factor Data Elements			
	Location of CWM	Table 13		0
	Ease of Access	Table 14		
	Status of Property	Table 15		
	Receptor Factor Data Elements			
	Population Density	Table 16		0
	Population Near Hazard	Table 17		
	Types of Activities/ Structures	Table 18		
	Ecological and /or Cultural Resources	Table 19		
	CHE MODULE TOTAL			0
	CHE Module Total		CHE Module Rating	
	92 to 100		A	
	82 to 91		B	
	71 to 81		C	
	60 to 70		D	
	48 to 59		E	
	38 to 47		F	
less than 38		G		
Alternative Module Ratings		Evaluation Pending		
		No Longer Required		
		<i>No Known or Suspected CWM Hazard</i>		
CHE MODULE RATING		<i>No Known or Suspected CWM Hazard</i>		

Table 21

HHE Module: Groundwater Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's groundwater and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional groundwater contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and display the CHF Value. If there is no known or suspected MC hazard present in the groundwater, select the box at the bottom of the table.

Note: Use dissolved, rather than total, metals analyses when both are available.

Contaminant	Maximum Concentration	Comparison Value	Unit	Ratios
CHF Scale	CHF Value	Sum The Ratios		
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$		
100 > CHF > 2	M (Medium)			
2 > CHF	L (Low)			
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).			
Migratory Pathway Factor				
DIRECTIONS: Circle the value that corresponds most closely to the groundwater migratory pathway at the MRS.				
Classification	Description			Value
Evident	Analytical data or observable evidence indicates that contamination in the groundwater is present at, moving toward, or has moved to a point of exposure.			H
Potential	Contamination in groundwater has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.			M
Confined	Information indicates a low potential for contaminant migration from the source via the groundwater to a potential point of exposure (possibly due to geological structures or physical controls).			L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
Receptor Factor				
DIRECTIONS: Circle the value that corresponds most closely to the groundwater receptors at the MRS.				
Classification	Description			Value
Identified	There is a threatened water supply well downgradient of the source and the groundwater is a current source of drinking water or source of water for other beneficial uses such as irrigation/agriculture (equivalent to Class I or IIA aquifer).			H
Potential	There is no threatened water supply well downgradient of the source and the groundwater is currently or potentially usable for drinking water, irrigation, or agriculture (equivalent to Class I, IIA, or IIB aquifer).			M
Limited	There is no potentially threatened water supply well downgradient of the source and the groundwater is not considered a potential source of drinking water and is of limited beneficial use (equivalent to Class IIIA or IIIB aquifer, or where perched aquifer exists only).			L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
No Known or Suspected Groundwater MC Hazard				○

Table 21 Comments: Contaminants identified in the shallow groundwater at T-7 include the explosives octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), 2,4,6-trinitrotoluene (TNT), 2,4,6-trinitrophenyl-N-methylnitramine (teteryl), the volatile organic compounds tetrachlorethylene (PCE), 1,1-dichloroethene, and trichloroethene (TCE), and the metal lead. (Shaw. 2007. Record of Decision, LAAP-10 Installation-wide Groundwater, Louisiana Army Ammunition Plant, July) While groundwater at Minden is covered by the 2007 ROD for USEPA OU-5, which selected monitored natural attenuation (MNA) / long-term monitoring (LTM) and institutional controls (ICs) (Shaw 2007). Further assessment is needed to determine if potential impacts from T-7 Area are directly contributing to groundwater impacts.

Table 22

HHE Module: Surface Water – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface water and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional surface water contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard for human endpoints present in the surface water, select the box at the bottom of the table.

Note: Use dissolved, rather than total, metals analyses when both are available.

Contaminant	Maximum Concentration	Comparison Value	Unit	Ratios
CHF Scale	CHF Value	Sum The Ratios		
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$		
100 > CHF > 2	M (Medium)			
2 > CHF	L (Low)			
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).			
Migratory Pathway Factor				
DIRECTIONS: Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.				
Classification	Description			Value
Evident	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.			H
Potential	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.			M
Confined	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to geological structures or physical controls).			L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
Receptor Factor				
DIRECTIONS: Circle the value that corresponds most closely to the surface water receptors at the MRS.				
Classification	Description			Value
Identified	Identified receptors have access to surface water to which contamination has moved or can move.			H
Potential	Potential for receptors to have access to surface water to which contamination has moved or can move.			M
Limited	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.			L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
No Known or Suspected Surface Water (Human Endpoint) MC Hazard				n
Table 22 Comments:				

Table 23

HHE Module: Sediment – Human Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's sediment and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional sediment contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with human endpoints present in the sediment, select the box at the bottom of the table.

Contaminant	Maximum Concentration	Comparison Value	Unit	Ratios
CHF Scale	CHF Value	Sum The Ratios		
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$		
100 > CHF > 2	M (Medium)			
2 > CHF	L (Low)			
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).			
<u>Migratory Pathway Factor</u>				
DIRECTIONS: Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.				
Classification	Description			Value
Evident	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.			H
Potential	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.			M
Confined	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to presence of geological structures or physical controls).			L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
<u>Receptor Factor</u>				
DIRECTIONS: Circle the value that corresponds most closely to the sediment receptors at the MRS.				
Classification	Description			Value
Identified	Identified receptors have access to sediment to which contamination has moved or can move.			H
Potential	Potential for receptors to have access to sediment to which contamination has moved or can move.			M
Limited	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.			L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
No Known or Suspected Sediment (Human Endpoint) MC Hazard				n
Table 23 Comments:				

Table 24

HHE Module: Surface Water – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface water and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional surface water contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with ecological endpoints present in the surface water, select the box at the bottom of the table.

Contaminant	Maximum Concentration	Comparison Value	Unit	Ratios
CHF Scale	CHF Value	Sum The Ratios		
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$		
100 > CHF > 2	M (Medium)			
2 > CHF	L (Low)			
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).			
<u>Migratory Pathway Factor</u>				
DIRECTIONS: Circle the value that corresponds most closely to the surface water migratory pathway at the MRS.				
Classification	Description			Value
Evident	Analytical data or observable evidence indicates that contamination in the surface water is present at, moving toward, or has moved to a point of exposure.			H
Potential	Contamination in surface water has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.			M
Confined	Information indicates a low potential for contaminant migration from the source via the surface water to a potential point of exposure (possibly due to presence of geological structures or physical controls).			L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
<u>Receptor Factor</u>				
DIRECTIONS: Circle the value that corresponds most closely to the surface water receptors at the MRS.				
Classification	Description			Value
Identified	Identified receptors have access to surface water to which contamination has moved or can move.			H
Potential	Potential for receptors to have access to surface water to which contamination has moved or can move.			M
Limited	Little or no potential for receptors to have access to surface water to which contamination has moved or can move.			L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
No Known or Suspected Surface Water (Ecological Endpoint) MC Hazard				n
Table 24 Comments:				

Table 25

HHE Module: Sediment – Ecological Endpoint Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's sediment and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the ratios together, including any additional sediment contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard with ecological endpoints present in the sediment, select the box at the bottom of the table.

Contaminant	Maximum Concentration	Comparison Value	Unit	Ratios
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CHF Scale	CHF Value	Sum The Ratios
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$
100 > CHF > 2	M (Medium)	
2 > CHF	L (Low)	
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).	
<u>Migratory Pathway Factor</u>		
DIRECTIONS: Circle the value that corresponds most closely to the sediment migratory pathway at the MRS.		
Classification	Description	Value
Evident	Analytical data or observable evidence indicates that contamination in the sediment is present at, moving toward, or has moved to a point of exposure.	H
Potential	Contamination in sediment has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.	M
Confined	Information indicates a low potential for contaminant migration from the source via the sediment to a potential point of exposure (possibly due to presence of geological structures or physical controls).	L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	
<u>Receptor Factor</u>		
DIRECTIONS: Circle the value that corresponds most closely to the sediment receptors at the MRS.		
Classification	Description	Value
Identified	Identified receptors have access to sediment to which contamination has moved or can move.	H
Potential	Potential for receptors to have access to sediment to which contamination has moved or can move.	M
Limited	Little or no potential for receptors to have access to sediment to which contamination has moved or can move.	L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).	
No Known or Suspected Sediment (Ecological Endpoint) MC Hazard		n
Table 25 Comments:		

Table 26

HHE Module: Surface Soil Data Element Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Record the maximum concentrations of all contaminants in the MRS's surface soil and their comparison values (from Appendix B of the Primer) in the table below. Additional contaminants can be recorded on Table 27. Calculate and record the ratios for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF by adding the contaminant ratios together, including any additional surface soil contaminants recorded on Table 27. Based on the CHF, use the CHF Scale to determine and record the CHF Value. If there is no known or suspected MC hazard present in the surface soil, select the box at the bottom of the table.

Contaminant	Maximum Concentration	Comparison Value	Unit	Ratios
CHF Scale	CHF Value	Sum The Ratios		
CHF > 100	H (High)	$CHF = \sum \frac{[\text{Maximum Concentration of Contaminant}]}{[\text{Comparison Value for Contaminant}]}$		
100 > CHF > 2	M (Medium)			
2 > CHF	L (Low)			
CONTAMINANT HAZARD FACTOR	DIRECTIONS: Record <u>the CHF Value</u> from above in the box to the right (maximum value = H).			
<u>Migratory Pathway Factor</u>				
DIRECTIONS: Circle the value that corresponds most closely to the surface soil migratory pathway at the MRS.				
Classification	Description			Value
Evident	Analytical data or observable evidence indicates that contamination in the surface soil is present at, moving toward, or has moved to a point of exposure.			H
Potential	Contamination in surface soil has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined.			M
Confined	Information indicates a low potential for contaminant migration from the source via the surface soil to a potential point of exposure (possibly due to presence of geological structures or physical controls).			L
MIGRATORY PATHWAY FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
<u>Receptor Factor</u>				
DIRECTIONS: Circle the value that corresponds most closely to the surface soil receptors at the MRS.				
Classification	Description			Value
Identified	Identified receptors have access to surface soil to which contamination has moved or can move.			H
Potential	Potential for receptors to have access to surface soil to which contamination has moved or can move.			M
Limited	Little or no potential for receptors to have access to surface soil to which contamination has moved or can move.			L
RECEPTOR FACTOR	DIRECTIONS: Record <u>the single highest value</u> from above in the box to the right (maximum value = H).			
No Known or Suspected Surface Soil MC Hazard				○

Table 26 Comments: Contaminants identified in the surface and subsurface soil at T-7 include 4-Amino-2,6-dinitrotoluene (4-AM-2,6-DNT), benzo(a)pyrene (B(a)P), and benzo(b)fluranthene (B(b)F). The human health risk assessment indicated no unacceptable risks under the industrial use scenario. The expanded ecological risk assessment indicated that no remedial action was necessary for the protection of ecological receptors. Therefore, the selected remedy for the soils at T-7 was NFA with a deed restriction. The deed restriction states that the property can only be used for commercial/industrial and military purposes (Shaw 2006). Further Site Specific Characterization of the T-7 Area is required.

Table 27

HHE Module: Supplemental Contaminant Hazard Factor Table

Contaminant Hazard Factor (CHF)

DIRECTIONS: Only use this table if there are more than five contaminants in any given medium present at the MRS. This is a supplemental table designed to hold information about contaminants that do not fit in the previous tables. Indicate the media in which these contaminants are present. Then record all contaminants, their maximum concentrations and their comparison values (from Appendix B of the Primer) in the table below. Calculate and record the ratio for each contaminant by dividing the maximum concentration by the comparison value. Determine the CHF for each medium on the

Note: Dissolved, rather than total, metals analyses are used when both are available.

Media	Contaminant	Maximum Concentration	Comparison Value	Ratio
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Table 28
Determining the HHE Module Rating

DIRECTIONS:

1. Record the letter values (H, M, L) for the Contaminant Hazard, Migration Pathway, and Receptor Factors for the media (from Tables 21–26) in the corresponding boxes below.
2. Record the media's three-letter combinations in the Three-Letter Combination boxes below (three-letter combinations are arranged from Hs to Ms to Ls).
3. Using the HHE Ratings provided below, determine each media's rating (A-G) and record the letter in the corresponding Media Rating box below.

Media (Source)	Contaminant Hazard Factor Value	Migratory Pathway Factor Value	Receptor Factor Value	Three-Letter Combination (Hs-Ms-Ls)	Media Rating (A-G)
Groundwater (Table 21)					
Surface Water/Human Endpoint (Table 22)					
Sediment/Human Endpoint (Table 23)					
Surface Water/Ecological Endpoint (Table 24)					
Sediment/Ecological Endpoint (Table 25)					
Surface Soil (Table 26)					

DIRECTIONS (cont.): 4. Select the single highest Media Rating (A is highest; G is lowest) and enter the letter in the HHE Module Rating box. Note: An alternative module rating may be assigned when a module letter rating is inappropriate. An alternative module rating is used when more information is needed to score one or more media, contamination at an MRS was previously addressed, or there is no reason to suspect contamination was ever present at an MRS.	HHE MODULE RATING		<i>Evaluation Pending</i>
	HHE Ratings (for reference only)		
	Combination	Rating	
	HHH	A	
	HHM	B	
	HHL	C	
	HMM	C	
	HML	D	
	MMM	D	
	HLL	E	
	MML	E	
	MLL	F	
LLL	G		
Alternative Module Ratings	<i>Evaluation Pending</i>		
	No Longer Required		
	No Known or Suspected MC Hazard		

Table 29
MRS Priority

DIRECTIONS: In the chart below, circle the letter rating for each module recorded in Table 10 (EHE), Table 20 (CHE), and Table 28 (HHE). Circle the corresponding numerical priority for each module. If information to determine the module rating is not available, choose the appropriate alternative module rating. The MRS Priority is the single highest priority; record this relative priority in the MRS Priority or Alternative MRS Rating at the bottom of the table.

Note: An MRS assigned Priority 1 has the highest relative priority; an MRS assigned Priority 8 has the lowest relative priority. Only an MRS with CWM known or suspected to be present can be assigned Priority 1; an MRS that has CWM known or suspected to be present cannot be assigned Priority 8.

EHE Rating	Priority	CHE Rating	Priority	HHE Rating	Priority
		A	1		
A	2	B	2	A	2
B	3	C	3	B	3
C	4	D	4	C	4
D	5	E	5	D	5
E	6	F	6	E	6
F	7	G	7	F	7
G	8			G	8
Evaluation Pending		Evaluation Pending		Evaluation Pending	
No Longer Required		No Longer Required		No Longer Required	
No Known or Suspected Explosive Hazard		No Known or Suspected CWM Hazard		No Known or Suspected MC Hazard	
MRS PRIORITY or ALTERNATIVE MRS RATING				4	

APPENDIX B
Photographic Log

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PHOTOGRAPHIC LOG



Client Name: USACE – Fort Worth District		Site Location: Camp Minden Army National Guard, Louisiana	Project No. 1293
Photo No. 1	Date: 1/16/14		
Direction Photo Taken: Northeast			
Description: View of heavily wooded area in the west central section of Test Area 7 (T-7).			

Photo No. 2	Date: 1/16/14	
Direction Photo Taken: North		
Description: View of the tree lined eastern fence line of the T-7 Area.		

PHOTOGRAPHIC LOG


Client Name: USACE – Fort Worth District		Site Location: Camp Minden Army National Guard, Louisiana	Project No. 1293
Photo No. 3	Date: 1/16/14		
Direction Photo Taken: Southwest			
Description: View of intact bunker located in the southwestern corner of the T-7 Area.			

Photo No. 4	Date: 1/16/14	
Direction Photo Taken: North		
Description: View of the field survey team completing transect 8. Notice the large wood debris pile to the left of the survey team.		

PHOTOGRAPHIC LOG

Client Name: USACE – Fort Worth District		Site Location: Camp Minden Army National Guard, Louisiana	Project No. 1293
Photo No. 5	Date: 1/16/14		
Direction Photo Taken: West			
Description: View of UXO Tech III using a Schonstedt GA-52cx Magnetic Locator to survey for metallic anomalies along transect 8.			

Photo No. 6	Date: 1/16/14	
Direction Photo Taken: Northeast		
Description: View of debris field along transect 9.		

PHOTOGRAPHIC LOG


Client Name: USACE – Fort Worth District		Site Location: Camp Minden Army National Guard, Louisiana	Project No. 1293
Photo No. 7	Date: 1/16/14		
Direction Photo Taken: East			
Description: View of an electric junction box with conduit leading into the ground. There were multiple locations of linear metallic anomalies which could be attributed to the buried conduit.			

Photo No. 8	Date: 1/16/14	
Direction Photo Taken: North		
Description: View of wood debris pile located along transect 10.		

PHOTOGRAPHIC LOG


Client Name: USACE – Fort Worth District		Site Location: Camp Minden Army National Guard, Louisiana	Project No. 1293
Photo No. 9	Date: 1/16/14		
Direction Photo Taken: North			
Description: View of concrete and metal debris field along transect 10.			

Photo No. 10	Date: 1/16/14	
Direction Photo Taken: North		
Description: View of field survey crew working around the wood debris pile to complete the survey of a transect.		

PHOTOGRAPHIC LOG


Client Name: USACE – Fort Worth District		Site Location: Camp Minden Army National Guard, Louisiana	Project No. 1293
Photo No. 11	Date: 1/16/14		
Direction Photo Taken: West			
Description: View of concrete and metal debris pile located along transect 14.			

Photo No. 12	Date: 1/16/14	
Direction Photo Taken: West		
Description: View of an electronic monitoring station located in the wooded area to the east of the gravel road. There were multiple arrays located throughout the wooded areas of the T-7 Area.		

PHOTOGRAPHIC LOG


Client Name: USACE – Fort Worth District		Site Location: Camp Minden Army National Guard, Louisiana	Project No. 1293
Photo No. 13	Date: 1/16/14		
Direction Photo Taken: North			
Description: View of field survey crew collecting the data point of a metallic anomaly.			

Photo No. 14	Date: 1/16/14	
Direction Photo Taken: South		
Description: View of wooded fence line along the western boundary. The bunker is in the background.		

PHOTOGRAPHIC LOG


Client Name: USACE – Fort Worth District		Site Location: Camp Minden Army National Guard, Louisiana	Project No. 1293
Photo No. 15	Date: 1/16/14		
Direction Photo Taken: East			
Description: View of field survey crew collecting the data point of a metallic anomaly. The field vehicles are parked on the gravel road in the background.			

Photo No. 16	Date: 1/16/14	
Direction Photo Taken: Southeast		
Description: View of door leading into the bunker. The door has a sign which posts the amount of explosives stored at the facility and the number of operators.		